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ABSTRACT

A recategorization system developed by Bannatyne to categorize subtest scatter from the Wechsler Intelligence Scale for Children-Revised (WISC-R) is used as an alternative to isolated analysis of each individual subtest. Reading disabled, learning disabled, and educable mentally handicapped students are categorized according to their performance in four areas: spatial, conceptual, sequential, and acquired knowledge. This study examined the utility of the Bannatyne recategorization system in discriminating among three groups of fourth through sixth grade handicapped students, using a stepwise discriminant functions analysis on the subtest scaled scores from the WISC-R for 294 learning disabled (LD), 36 educable mentally retarded (EMR), and 71 emotionally disturbed (ED) students. The results revealed that 100% of the EMR and ED students were predicted to be labeled ID on the basis of this recategorization, while 99.7% of the LD students were predicted to be LD. (These finding are examined in relation to the use of alternative statistical methods and different diagnostic procedures to identify and classify students). (Author/GDC)

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Bannatyne's Recategorization in the Differential Diagnosis of Learning Disabled, Emotionally Disturbed, and Educably Mentally Retarded Students

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Abstract

Research investigating the factor structure of the WISC-R has resulted in the development of several different systems to categorize subtest scatter patterns. The intent of these systems is to provide a holistically integrated procedure for interpretation as an alternative to analysis of each individual subtest in an isolated way. A popular recategorization system is that proposed by Bannatyne (1968,1974). In this system four factors have been delineated and related to the differential diagnosis of the learning disabled, reading disabled, and educably mentally retarded. Most studies investigating the usefulness of this system have employed it in the differentiation of learning disabled from average students or have been involved with a one-group design comparing actual performance to what is predicted.

This study examines the utility of the Bannatyne recategorization system in discriminating among three groups of handicapped students. A stepwise discriminant functions analysis was performed on the subtest scaled scores from the WISC-R for 294 learning disabled (LD), 36 educably mentally retarded (EMR) and 71 emotionally disturbed (ED) students. The results of this analysis revealed that 100% of the EMR and ED students were predicted to be labeled LD on the basis of this recategorization, while 99.7% of the LD students were predicted to be LD. These findings are examined in relation to the use of alternative statistical methods and different diagnostic procedures to identify and classify students.

Bannatyne's Recategorization in the Differential Diagnosis of Learning Disabled, Emotionally Disturbed, and Educably Mentally Retarded Students

Research on the WISC and WISC-R reflects a continued search for a characteristic subtest scatter pattern profile which practically distinguishes among various groups of handicapped and/or atypical learners. Factor analytic studies of the WISC-R have delineated a three-factor model to distinguish learning and reading disabled from educably mentally handicapped students. The major problems with this three-factor model are its inability to account for the typically very poor performance of learning and reading disabled students on the Information subtest, the frequently adequate performance of educably mentally handicapped students on Digit Span, and their usually poor performance on Vocabulary (Kaufman, 1979). Several alternative categorization systems have been developed for use with the Wechsler subtests in an attempt to explain these findings. One of the most popular altenrnatives is Bannatyne's (1968, 1974) recategorization.

Bannatyne (1968) has suggested that the Wechsler subtests scores of genetic dyslexic readers can be best analyzed in terms of these three categories: Spatial, Sequential, and Conceptual. The Spatial category is comprised of the student's summed scores on the Block Design, Object Assembly, and Picture Completion subtests from the WISC or WISC-R. Purportedly, these three subtests collectively measure the ability to recognize spatial relationships and to manipulate objects either directly or symbolically in multidimensional space. The Sequential category consists of the summed scores achieved in Picture Arrangement, Digit Span, and Coding and is thought to measure the ability to retain visual and auditory information within the short-term memory. The Conceptual category is related to general verbal language use and function, and is derived from the summed scores

obtained in the Comprehension, Similarities, and Vocabulary subtests. The scores in each of these three categories may be compared either to the student's own performance throughout the test (intra-individual performance) or to the norm group's performance in each of these areas (inter-individual performance). The purpose of this recategorization system is to provide the clinician with a practical tool which facilitates the identification and diagnosis of various subgroups of learning handicapped students (Bannatyne, 1974). Initial studies showed that dyslexic readers scored highest in the Spatial category, moderate in the Conceptual category, and lowest in the Sequential category (Bannatyne, 1974). The diagnostic implication of these findings is that students who demonstrate a similar pattern of performance on the Wechsler intelligence scale may have a reading problem associated with genetically inherited dyslexia.

Bannatyne later revised this initial three-factor categorization to include a fourth category, Acquired Knowledge (which consists of the summed scores obtained in the Information, Arithmetic, and Vocabulary subtests). Several studies have examined the usefulness of the four-factor reclassification scheme in differentiating among reading disabled, learning disabled, and educably mentally handicapped students (Rugel, 1974; Smith, Coleman, Dokecki, and Davis, 1977). These studies have shown that reading and learning disabled students perform in the following pattern, from highest to lowest scores: Spatial, Conceptual, Sequential, and Acquired Knowledge. The pattern of performance for educably mentally handicapped students was shown to be, from highest to lowest scores: Spatial Sequential, Conceptual, and Acquired Knowledge. Clearly, the pattern of performance among these three groups of disabled learners is very similar.

Much of the previous research on the usefulness of Bannatyne's reclassification system in differential diagnosis has examined either within-group patterns of performance or compared the performance of a handicapped group with a group of

normal learners. In the former studies, the resulting findings are usually compared with the predicted performance pattern as suggested by the model. Given that the primary purpose of this recategorization system is to aid the clinician in the identification of exceptional students, it is of particular interest to determine how effectively the system distinguishes among different groups of handicapped students. Even though the performance of reading and learning disabled students and educably mentally handicapped students appears to form a consistent trend within the system, it may be that these groups of atypical learners can be distinguished from each other on the basis of factors other than the mere rank ordering of performance in each of the four categories. Subsequently, the rank-order trend may be only an artifact of the model and not a useful standard by which to base a diagnosis. This study examines the utility of Bannatyne's four-factor recategorization model in differentiating among students classified as learning disabled, emotionally disturbed, or educably mentally handicapped. All students in the learning disabled group had specific primary problems in the acquisition of reading skills.

METHODS

Participants

The case files of 401 students, enrolled in grades four through six, identified by school planning and placement teams as handicapped, and labeled as either learning disabled, emotionally disturbed, or educably mentally handicapped were examined for a record of intelligence testing using the Wechsler Intelligence Scale for Children-Revised (WISC-R) which had been performed only during the previous academic year. From this procedure WISC-R data were collected on 294 learning disabled, 36 educably mentally handicapped, and 71 emotionally disturbed students as agreed by the school special services personnel. Across the three

groups the mean Verbal IQ score was 87.86 (SD = 15.41), the mean Performance IQ score was 91.61 (SD = 15.98), and the mean Full Scale IQ score was 89.09 (SD = 15.69).

Procedures

The scaled scores from each individual WISC-R were recategorized according to Bannatyne's (1974) four-factor scheme of Spatial, Conceptual, Sequential, and Acquired Knowledge. Following this recategorization a stepwise discriminant functions analysis was used to determine the extent to which this four-factor model differentiated among the three identified groups of handicapped learners. Finally, trends within each of the three diagnostic groups, as well as for the total group, were examined and compared with those trends which Bannatyne originally indicated.

RESULTS AND DISCUSSION

The stepwise discriminant functions analysis was performed in an attempt to determine the extent to which the recategorization of WISC-R subtest scaled scores would differentiate among the three groups of handicapped students. Table 1 presents a summary for this discriminant analysis. The results of this analysis

Insert Table 1 About Here

indicated that 99.7% of the students actually labeled by the school special services personnel as learning disabled (LD) would be predicted to be LD on the basis of this recategorization. Only one student from the LD was predicted to be emotionally disturbed (ED), while none were predicted to be members of the educably mentally handicapped (EMH) group. The discriminant analysis also indicated that 100% of the members of the ED and EMH groups would be predicted to be LD on the basis of the recategorization.

Use of the Bannatyne recategorization results in a clear over-classification

of non-learning disabled students as LD. Moreover, the recategorization appears to have little value in differentiating EMH from LD students, even though the four-factor model was developed with the intent of distinguishing between these two groups.

The reason for this failure to differentiate among the three groups becomes

Insert Table 2 About Here

somewhat more evident by examination of the means and standard deviations for each individual group and the total group as presented in Table 2. The maximum distance between the largest mean (ED, Spatial) and the smallest mean (EMH, Acquired Knowledge) is only 3.384 points. Further, the standard deviations associated with these two means, as with all the other means in each category by diagnostic group, are relatively large. In fact, the smallest mean standard deviation is 1.498, although most are in the high two's to low three's. There is very little unique variance within any of the diagnostic groups or recategorization classes.

Bannatyne (1974) and Rugel (1974) suggested that the recategorization be analyzed in terms of a profile of relative strengths and weaknesses. Their findings have shown that a disabled reader may be distinguished from a normal reader on the basis of a category-by-category comparison. Table 3 presents a rank-ordering for each of the four categories by diagnostic group and the total group. These findings snow the profile pattern for the LD and ED groups to be, from

Insert Table 3 About Here

highest to lowest: Spatial, Conceptual, Acquired Knowledge, and Sequential. The profile for the EMH group was: Sequential, Spatial, Conceptual, and Acquired Knowledge. This is in contrast to the patterns outlined by Bannatyne (1974), showing that disabled readers performed poorest in Acquired Knowledge and higher than normal readers in Spatial. The mean Spatial score for the LD group was

8.565, which falls in the low end of the average range according to Wechsler's (1974) method for interpreting individual subtest scaled scores. A comparison of the profiles obtained in the present study with that predicted by Bannatyne (1974) is also depicted in Table 3.

The implications of these findings have significance for the specific use of the Bannatyne recategorization as an aid in differential diagnosis and for the general issue of reliance upon subtest pattern profiles and/or systems in the identification of handicapped and atypical learners. Bannatyne's recategorization may have some usefulness in differentiating normal learners from handicapped learners, as suggested in several previous studies (cf. Rugel, 1974). But, this system has almost no value in distinguishing among specific subgroups of handicapped or atypical learners as demonstrated by the results from the discriminant functions analysis. Use of this four-factor system to establish profile trends seems particularly tenuous, given the small differences among means, and the large standard deviations, within each diagnostic group for each of the four categories. The specific profile of relative strengths and weaknesses may vary from sample to sample. Subsequently, reliance upon profile analyses has little transfer generalizability and will probably result in a number of false positives identified as LD.

These findings, along with the findings from studies attempting to define a characteristic intellectual profile for disabled readers on the WISC and WISC-R (Belmont and Birch, 1966; Bortner and Birch, 1969) point to the futility of "cookbook" methods in differential diagnosis. Interpretation of performance on norm-referenced testing must be supplemented by analysis of the student's actual behavior and learning styles and strategies in real-life settings. It is only through trained clinical behavioral observation, coupled with careful scrutiny and analysis of norm-referenced test data that the most appropriate and effective educational interventions may be generated and implemented.

Table 1

Summary Table for the Discriminant Functions Analysis
Indicating Numbers and Percentages of Students for Predicted Group Membership

		Predicted Group Membership		
Actual Group Membership		LD	ED	EMH
Learning Disabled (LD)	n	293	1	0
	%	99.7	0.3	0
Emotionally Disturbed (ED)	n	71	0	0
	%	100	0	0
Educably Mentally Handicapped (EMH)	n	36	0	0
	%	100	0	0

Table 2

Means ($\bar{x}$) and Standard Deviations (SD) by Group and for the Total Group for each of the Four Bannatyne Categories

Bannatyne Categories	Learning Disabled		Emotionally Disturbed		Educably Mentally Handicapped		Total Group	
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
Spatial	8.565	3.374	9.014	3.108	7.139	3.074	8.516	3.328
Conceptual	7.800	3.586	8.300	2.717	5.787	3.105	7.708	3.457
Sequential	7.236	2.272	7.817	2.834	7.167	1.498	7.333	2.332
Acquired Knowledge	7.375	2.901	7.761	2.590	5.630	2.590	7.228	2.867

Table 3

Rank-Order Profile* for each Group and the Total Group
Using Bannatyne's Recategorization

	Spatial	Conceptual	Sequential	Acquired Knowledge
Learning Disabled	1	2	4	3
Bannatyne's (1974) Profile	1	2	3	4
Emotionally Disturbed	1	2	4	3
Educably Mentally Handicapped	2	3	1	4
Bannatyne's (1974) Profile	1	3	2	4
TOTAL GROUP	1	2	3	4

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